

What is Clamed is:

5 1. A semiconductor device for detecting a neutron comprising:
a semiconductor substrate; and
a boron containing layer containing isotope ^{10}B , the layer being
formed on said semiconductor substrate.

10 2. A semiconductor device according to claim 1, further
comprising a PN junction formed on a surface area of said semiconductor
substrate below said boron containing layer; wherein
an electron - positive hole pair are generated in a depletion
layer of said PN junction by α ray generated by a reaction between said
neutron and said isotope ^{10}B ; and
15 the neutrons is detected on the basis of the quantity of electric
charge of the electron- positive hole pairs.

20 3. A semiconductor device according to claim 2, further
comprising an analyzing circuit portion including a predetermined
semiconductor element on said semiconductor substrate in a region other
than the region where said neutron is detected.

25 4. A semiconductor device according to claim 3, wherein the
concentration of said isotope ^{10}B in said boron containing layer in
said analyzing circuit portion is lower than that of said isotope ^{10}B
of said boron containing layer in the region where said neutron is
detected.

30 5. A semiconductor device according to claim 3, wherein no boron
containing layer is provided on said analyzing circuit portion.

6. A method for fabricating a semiconductor device for detecting

a neutron comprising the steps of :

doping a predetermined impurity into a first region on a semiconductor substrate to form a PN junction on a surface region of said semiconductor substrate;

5 forming an analyzing circuit section in a second region of said semiconductor substrate for analyzing detected neutron; and

forming a boron containing layer that contains an isotope ^{10}B that reacts with said neutron to generate an α ray on said semiconductor substrate in at least said first region.

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7. A method for fabricating a semiconductor device according to claim 6, wherein said boron containing layer is formed on said semiconductor substrate in said first and second regions, and

15 said concentration of said isotope ^{10}B in said second region is lower than that of said isotope ^{10}B in the first region.

8. A method for fabricating a semiconductor device according to claim 6, wherein said boron containing layer is formed only on said semiconductor substrate in said first region.

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